



WATER FACT SHEET

U.S. GEOLOGICAL SURVEY, DEPARTMENT OF THE INTERIOR

U.S. GEOLOGICAL SURVEY GROUND-WATER STUDIES IN NORTH CAROLINA

GROUND-WATER ISSUES

Ground water is the source of domestic supplies for nearly 58 percent of the 6.2 million North Carolina residents; of these residents, 2.8 million live in rural areas and obtain their water from private wells. About 435 million gallons per day of fresh ground water is used in North Carolina. The aquifers of the Coastal Plain province of the State are the source for many of the largest ground-water withdrawals. In the Piedmont and Blue Ridge provinces, ground water is the source for nearly all self-supplied domestic uses and for many small and moderate-size public and self-supplied industrial systems. Statewide, ground-water discharge supplies about 60 percent of all streamflow. The major issues related to ground water in North Carolina are:

- Declining water levels,
- Contamination from hazardous wastes and landfill leachate, and
- Effects of land use on water quality.

U.S. GEOLOGICAL SURVEY PROGRAMS

The U.S. Geological Survey (USGS), established in 1879, is the principal source of scientific and technical expertise in the earth sciences within the Federal government. USGS activities include research and services in the fields of geology, hydrology, and cartography. The mission of the Water Resources Division of the USGS is to develop and disseminate scientific information on the Nation's water resources. The activities of the Water Resources Division in North Carolina are conducted by scientists, engineers, technicians, and support staff in offices in Raleigh, Asheville, Winston-Salem, and Charlotte.

Hydrologic-data stations are maintained at selected locations throughout North Carolina, and constitute a water-resources data network to record stream discharge and stage, reservoir and lake storage, ground-water levels, and the quality of water. Water-resources data are stored in the USGS National Water Data Storage and Retrieval System data base. These data are used by water planners and others involved in decisions that affect North Carolina's water resources.




During 1987, the USGS, in cooperation with Federal, State, and local agencies, maintained a network of about 250 observation wells to monitor fluctuations in water levels. Water-level measurements from these wells are used to detect changes in ground-water storage and the effects of pumpage on the ground-water system. In addition, about 340 other observation wells are measured or sampled regularly as part of several ground-water studies.

The USGS has conducted more than 100 hydrologic investigations in North Carolina. During fiscal year 1987, the USGS entered into agreements with 30 Federal, State, and local agencies involving 20 hydrologic investigations in North Carolina; nine investigations included studies of ground-water quantity and quality. These investigations provide information needed to answer hydrologic questions that are specific to the State's principal ground-water issues. Also, some of these investigations provide information on statewide, multistate, and national hydrologic problems. Three examples of ground-water studies by the USGS that address specific ground-water issues in North Carolina are discussed in the following sections.

Ground Water in the Central Coastal Plain

Increasingly heavy ground-water use by several cities and towns, such as Kinston, Greenville, New Bern, Jacksonville, and several industries, have resulted in continually declining water levels in the sand aquifers that supply most of the water for this multicounty area. State and local water managers realized that a regional approach to ground-water management would be required to manage the resource effectively. Therefore, information on ground-water movement, areas of ground-water recharge and discharge, and location and potential movement of saltwater in the water-supply and adjacent aquifers was needed. From 1983 through 1987, the USGS, in cooperation with the North Carolina Department of Natural Resources and Community Development and 14 municipal and county

STUDY AREAS

-  Central Coastal Plain
-  Marine Corps Air Station
-  Mecklenburg County



water-supply systems, studied the ground-water system in the central coastal plain. Geologic and hydrologic data from several new and many older wells were used to delineate the four major aquifers and associated confining beds. These data and water-use information also were used to develop a ground-water flow model that is useful for analyzing the regional effect of several pumping plans on water levels and ground-water movement. The model also is useful for estimating the effects of declining water levels, and for detecting the potential for saltwater intrusion. Results of this study can be used by numerous municipalities and industries to plan optimum spacing of wells and prudent water withdrawals.

Potential for Contamination, Cherry Point Marine Corps Air Station

Hazardous and toxic wastes have been disposed of at 14 land-fill sites at the Cherry Point Marine Corps Air Station. These wastes have contaminated the ground water in parts of the shallow sand aquifer that underlies the Air Station. The highest concentrations of the waste and spill sites are near several production wells that supply most of the water for this military installation. Ground-water withdrawals have increased the potential for contamination in the shallow aquifer to move down through clay confining beds into a deep limestone and sand aquifer that is the source of water for the entire Air Station and for several nearby towns. The U.S. Marine Corps, concerned that the Air Station's water supply may have been contaminated, entered into a cooperative agreement with the USGS in 1986 to analyze the quality of ground water withdrawn from supply wells, determine if the aquifer has been contaminated by the wastes, and offer alternative ground-water management practices that might reduce further contamination. Traces of contaminants have been detected in water from some supply wells. Test holes and wells have been constructed. Samples of geologic material from the aquifers and confining beds, as well as water samples, have been collected. These data will be incorporated into a computer model of ground-water flow that will be used by the Marine Corps in making water-management decisions.

Water Quality in Urban Areas in Mecklenburg County

Mecklenburg County and Charlotte, the county seat and largest city in North Carolina, constitute one of the State's most highly industrialized, rapidly growing urban areas. Water managers there are confronted with several water-quality problems, such as the inability to obtain permits from State regulatory agencies for new sanitary landfills and not knowing the effects of urban runoff on receiving waters, particularly those used for water supply. Local officials may have to regulate non-point source runoff, but lack an adequate data base with which to address this concern. The USGS has been involved in a cooperative study with the city of Charlotte and Mecklenburg County since 1979 to evaluate effects of urbanization on the quality of the area's water resources. Results of a reconnaissance study of the quality of streamflow during high- and low-flow periods indicated evidence of degradation of water quality throughout the county. Current emphasis is on the vertical and horizontal movement of leachate from landfills. Changes in the water budgets of small basins dominated by landfill-type land

use also are being investigated to determine how landfills alter overland runoff and base-flow components of streamflow.

GROUND-WATER MANAGEMENT

The principal State agencies responsible for ground-water management in North Carolina are the Department of Natural Resources and Community Development (DNRCD) and the Department of Human Resources (DHR). Various divisions of the DNRCD issue permits for well construction and major ground-water withdrawals and maintain a contamination-incident management program. The Division of Health Services in the DHR regulates solid- and hazardous-waste disposal sites and is responsible for the human-health aspects of public water-supply systems. During fiscal year 1988, the following Federal, State, and local agencies entered into cooperative cost-sharing or interagency agreements with the USGS to conduct ground-water investigations in North Carolina.

Cities of Charlotte, Jacksonville, Kinston, and New Bern
Counties of Greene, Jones, Mecklenburg, and Onslow
Greenville Utilities Commission
Guilford County Soil and Water Conservation District
North Carolina Department of Human Resources
North Carolina Department of Natural Resources and Community Development
North Lenoir Water Corporation
Towns of Ayden, Farmville, La Grange, Pinetops, Snow Hill, and Stantonburg
U.S. Marine Corps

SELECTED REFERENCES

- Giese, G.L., Mason, R.R., and Strickland, A.G., 1987, North Carolina ground-water quality, with a section on ground-water quality management by M.C. Bailey: U.S. Geological Survey Open-File Report 87-0743, 8 p.
- Turner, J.F., and Deckard, R.J., 1986, Activities of the U.S. Geological Survey Water-Resources Division in North Carolina, 1985-86: U.S. Geological Survey Open-File Report 86-226, 69 p.
- U.S. Geological Survey, 1984, National water summary 1983—Hydrologic events and issues: U.S. Geological Survey Water-Supply Paper 2250, 243 p.
- , 1985, National water Summary 1984—Hydrologic events, selected water-quality trends, and ground-water resources: U.S. Geological Survey Water-Supply Paper 2275, 467 p.

Information on technical reports and data related to ground water in North Carolina can be obtained from:

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